

WE CLAIM AS OUR INVENTION:

1. A process for the catalytic conversion of a feedstream containing an oxygenate to light olefins using a fluidized conversion zone and a relatively expensive fluidized catalyst containing an ELAPO molecular sieve with recovery and recycle of
5 contaminating catalyst particles from the product effluent stream withdrawn from the conversion zone, which process comprises the steps of:
 - a) contacting the feedstream with the fluidized catalyst in the fluidized conversion zone at conversion conditions effective to form a mixture of deactivated catalyst particles and olefinic reaction products;
 - 10 b) separating at least a portion of the deactivated catalyst particles from the resulting mixture in a vapor-solid separating zone containing at least one vapor-solid cyclonic separating means to form a stream of deactivated catalyst particles and a conversion zone product effluent stream containing light olefins, unreacted oxygenates, H₂O, other reaction products and undesired
15 amounts of contaminating catalyst particles;
 - c) passing the conversion zone product effluent stream to a wet scrubbing zone and therein contacting the effluent stream with a scrubbing liquid under scrubbing conditions effective to form a substantially catalyst-free overhead stream containing light olefins and a liquid bottom stream containing a
20 mixture of the contaminating catalyst particles and the scrubbing liquid;
 - d) passing at least a portion of the stream of the deactivated catalyst particles formed in step (b) to a regeneration zone and therein contacting the

- deactivated catalyst particles with an oxidizing gas stream under oxidizing conditions effective to form a stream of regenerated catalyst particles;
- e) recycling at least a portion of the liquid bottom stream produced in step (c) to step (a) or step (d); and
- 5 f) passing at least a portion of the stream of regenerated catalyst particles from step (d) to step (a).
2. The process as defined in claim 1 wherein the oxygenate is an oxygen-substituted aliphatic material containing 1 to 4 carbon atoms.
3. The process as defined in claim 2 wherein the oxygen-substituted aliphatic
- 10 material is an alcohol, an ether, an aldehyde, an ketone or mixtures thereof.
4. The process as defined in claim 1 wherein the oxygenate is methanol or dimethylether or a mixture thereof.
5. The process as defined in claim 1 wherein the ELAPO molecular sieve is a SAPO molecular sieve.
- 15 6. The process as defined in claim 5 wherein the SAPO molecular sieve is SAPO-34 or SAPO-17 or mixture thereof.
7. The process as defined in claim 1 wherein the fluidized conversion zone is a fast-fluidized bed reactor system.
8. The process as defined in claim 1 wherein at least a portion of the liquid
- 20 bottom stream from the wet scrubbing zone is recirculated to the scrubbing zone in order to allow the concentration of the contaminating catalyst particles to increase in the bottom stream.

9. The process as defined in claim 1 wherein at least a portion of the liquid bottom stream recovered from the wet scrubbing zone is passed to a liquid-solid separating zone containing one or more liquid-solid separating means operated under separating conditions effective to produce an solid-rich stream containing a relatively rich slurry of contaminating catalyst in the scrubbing liquid and a relatively solid-lean stream containing scrubbing liquid wherein at least a portion of the underflow stream is recycled to step (a) or to step (d).

10. The process as defined in claim 1 wherein the scrubbing liquid used in step (c) is water.

10 11. The process as defined in claim 1 wherein the scrubbing liquid used in step (c) is water containing an alkaline reagent compatible with the catalyst in an amount sufficient to neutralize a significant portion of any acidic by-products of the oxygenate conversion reaction.

12. The process as defined in claim 1 wherein the contaminating catalyst particles contain deactivating coke deposits in an amount sufficient to prevent any substantial damage to their catalytic activity when they are exposed to the hydrothermal shock of step (c) or the thermal shock of step (d).

13. The process as defined in claim 1 wherein the conversion zone product effluent stream is substantially cooled between steps (b) and (c).

20 14. The process as defined in claim 1 wherein the conversion zone product effluent stream is at a temperature of about 350° to about 600°C upon exit from step (b)

and step (c) is operated to produce a liquid bottom stream having a temperature of about 100° to about 135°C.

15. A process for the catalytic conversion of a feedstream containing methanol to light olefins using a fluidized conversion zone and a relatively expensive fluidized catalyst containing a SAPO molecular sieve with recovery and recycle of contaminating catalyst particles from the product effluent stream withdrawn from the conversion zone, which process comprises the steps of:

- a) contacting the feedstream with the fluidized catalyst in the fluidized MTO conversion zone at conversion conditions effective to form a mixture of deactivated catalyst particles and olefinic reaction products;
- b) separating at least a portion of the deactivated catalyst particles from the resulting mixture in a vapor-solid separating zone containing at least one vapor-solid cyclonic separating means to form a stream of deactivated catalyst particles and an MTO conversion zone product effluent stream containing light olefins, unreacted methanol, H₂O, other reaction products including DME and undesired amounts of contaminating SAPO-containing catalyst particles;
- c) passing the MTO conversion zone product effluent stream to a wet scrubbing zone and therein contacting the effluent stream with a scrubbing liquid under scrubbing conditions effective to form a substantially catalyst-free overhead stream containing light olefins and a liquid bottom stream containing a mixture of the contaminating catalyst particles and the scrubbing liquid;

- d) passing at least a portion of the stream of the deactivated catalyst particles formed in step (b) to a regeneration zone and therein contacting the deactivated catalyst particles with an oxidizing gas stream under oxidizing conditions effective to form a stream of regenerated catalyst particles;
 - 5 e) recycling at least a portion of the bottom stream produced in step (c) to step (a) or step (d); and
 - f) passing at least a portion of the stream of regenerated catalyst particles from step (d) to step (a).
16. The process as defined in claim 15 wherein the SAPO molecular sieve is
10 SAPO-34 or SAPO-17 or a mixture thereof.
17. The process as defined in claim 15 wherein the fluidized MTO conversion zone is a fast-fluidized bed reactor system.
18. The process as defined in claim 15 wherein at least a portion of the liquid bottom stream from the wet scrubbing zone is recirculated to the scrubbing zone in order
15 to allow the concentration of the contaminating catalyst particles to increase in the bottom stream.
19. The process as defined in claim 15 wherein at least a portion of the liquid bottom stream recovered from the wet scrubbing zone is passed to a liquid-solid separating zone containing one or more liquid-solid separating means operated under
20 separating conditions effective to produce a solid-rich underflow stream containing a relatively rich slurry of contaminating catalyst in the scrubbing liquid and a relatively

solid-lean stream containing scrubbing liquid wherein at least a portion of the solid-rich stream is recycled to step (a) or to step (d).

20. The process as defined in claim 15 wherein the scrubbing liquid used in step (c) is water.

5 21. The process as defined in claim 15 wherein the contaminating SAPO-containing catalyst particles contain deactivating coke deposits in an amount sufficient to prevent any substantial damage to their catalytic activity when they are exposed to the hydrothermal shock of step (c) or the thermal shock of step (d).

10 22. The process as defined in claim 15 wherein the MTO conversion zone product effluent stream is substantially cooled between steps (b) and (c).